

### REMARKS

By this Amendment, claim 1 is amended, and claims 3 and 4 are cancelled. Claims 2, 6 and 7 remain in the application. Thus, claims 1-2 and 6-7 are active in the application. Reexamination and reconsideration of the application are respectfully requested.

In the September 9, 2005 Amendment, the Applicants requested the Examiner to supply the Applicants with a corrected Office Action Summary form (Form PTOL-326) of the Office Action Summary form attached to the previous Office Action dated June 9, 2005. In particular, the Applicants note that item 1 on this Office Action Summary form indicated that the June 9, 2005 Office Action was “responsive to communication(s) filed on 18 April 2003.” However, the June 9, 2005 Office Action was responsive to the filing of the present application on September 24, 2003. Furthermore, the Applicants note that item 3 under the “Attachment(s)” header indicated that a copy of the “4-18-03” Information Disclosure Statement (IDS) was returned to the Applicants. However, the IDS filed in the present application was filed on September 24, 2003, not on April 18, 2003.

Accordingly, the Applicants again respectfully request the Examiner to supply the Applicants with a corrected Office Action Summary form of the June 9, 2005 Office Action indicating that the June 9, 2005 Office Action was responsive to the communication filed on September 24, 2003 and that a copy of the September 24, 2003 IDS was returned to the Applicants.

On page 2 of the present Office Action, claims 1-4 and 6-7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Jairazhboy et al. (U.S. 5,685,475) in view of Iwana (JP 55-16726). In addition, on page 2 of the Office Action, claims 1-7 were rejected under 35 U.S.C. § 102(b) as being anticipated by Jairazhboy et al.

The Applicants submit that the rejection of claims 1-7 under 35 U.S.C. § 102(b) as being anticipated by Jairazhboy et al. was inadvertently copied from the previous Office Action dated June 9, 2005. Initially, the Applicants note that all of claims 1-7 were not presented in the September 9, 2005 Amendment, and thus, it appears that the rejection of claims 1-7 was copied from the June 9, 2005 Office Action.

Furthermore, as clearly demonstrated in the September 9, 2005 Amendment, Jairazhboy et al. does not disclose, suggest or even contemplate the conditioning chamber of claim 1 between the solder material supplying chamber and the cooling chamber since Jairazhboy et al. discloses preheating a board before molten solder is applied to the board in order to avoid thermal shock to the board (see Column 2, lines 18-34).

Moreover, the Applicants note that the Examiner did not allege in the present Office Action that Jairazhboy et al. discloses the conditioning chamber of claim 1. Instead, the Examiner alleged that Iwana discloses the conditioning chamber of claim 1.

Accordingly, in view of the foregoing remarks and the remarks presented in the September 9, 2005 Amendment, the Applicants respectfully submit that claims 1-2 and 6-7 of the present application are clearly not anticipated by Jairazhboy et al. since Jairazhboy et al. fails to disclose the conditioning chamber of claim 1.

The rejection of claims 1-4 and 6-7 under 35 U.S.C. § 103(a) as being unpatentable over Jairazhboy et al. in view of Iwana is respectfully traversed for the following reasons.

As described in paragraph [0015] of the specification, an object of the present invention is to solve the problem of a “lift-off” phenomenon that is specific to the use of lead-free solder in a flow soldering process, because conventional processes are problematically susceptible to the “lift-off” phenomenon which frequently occurs when lead-free solder material is used. As described in paragraph [0014] of the specification, lead-free solder material is frequently susceptible to the lift-off phenomenon because the rate of solidification and the resultant strength of the solidified lead-free solder material often distinctly vary at different areas of the board to which molten lead-free solder is applied.

To reduce the lift-off phenomenon that is so common in conventional processes, the inventors of the present invention discovered through careful analysis that rapid cooling is effective to alleviate the problems of lift-off. In particular, the inventors of the present invention discovered that after solder material is adhered to a predetermined portion of a board, cooling the board allows for the solder material adhering to the board to rapidly cool and thereby solidify.

Furthermore, as described in paragraph [0023], the inventors of the present invention discovered that liquid cooling is advantageous for rapidly cooling the board so that solder material adhering to the board is rapidly cooled to solidify. In particular, the inventors of the present invention discovered that liquid cooling is advantageous over gas cooling because since liquid cooling can use a latent heat of vaporization of the liquid. Gas cooling, on the other hand, as discovered by the inventors, cannot use a latent heat of vaporization.

Before the inventors conceived the present invention, techniques for reducing the lift-off phenomenon were not known to those skilled in the art.

Claim 1 recites the above-described features of the present invention. Claim 1 was amended to include the liquid cooling operation originally recited in claim 3.

Claim 1 recites an apparatus for mounting an electronic component onto a board through a lead-free solder material by means of a flow soldering process. Furthermore, the apparatus of claim 1 recites a cooling chamber including a cooling unit which is operable to use liquid cooling to cool the board such that the solder material adhering to the board is rapidly cooled to solidify.

Neither Jairazhboy et al. nor Iwana disclose or suggest mounting an electronic component onto a board through a lead-free solder material and using liquid cooling to cool the board such that the solder material adhering to the board is rapidly cooled to solidify.

In contrast to the present invention, Jairazhboy et al. does not contemplate the use of a lead-free solder material, and Jairazhboy et al. only uses a gas in a cooling unit (see Column 3, lines 25-31).

Iwana merely discloses a technique of applying infrared rays at portions of a board where solder tends to become separated in order to heat the board after solder is supplied thereto. Accordingly, similar to Jairazhboy et al., Iwana does not disclose, suggest or even contemplate mounting an electronic component onto a board through a lead-free solder material and using liquid cooling to cool the board such that the solder material adhering to the board is rapidly cooled to solidify, as recited in claim 1.

Therefore, Jairazhboy et al. and Iwana each clearly fail to disclose, suggest or even contemplate mounting an electronic component onto a board through a lead-free

solder material and using liquid cooling to cool the board such that the solder material adhering to the board is rapidly cooled to solidify, as recited in claim 1.

Accordingly, no obvious combination of Jairazhboy et al. and Iwana would result in the invention of claim 1 since Jairazhboy et al. and Iwana, either individually or in combination, clearly fail to disclose or suggest each and every limitation of claim 1.

Furthermore, it is submitted that the distinctions discussed above are such that a person having ordinary skill in the art at the time the invention was made would not have been motivated to modify Jairazhboy et al. and Iwana in such a manner as to result in, or otherwise render obvious, the present invention as recited in claim 1.

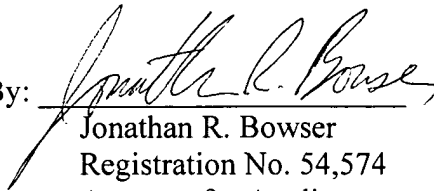
Therefore, it is submitted that the claim 1, as well as claims 2 and 6-7 which depend therefrom, are clearly allowable over the prior art as applied by the Examiner.

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is clearly in condition for allowance. An early notice thereof is respectfully solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, the Examiner is respectfully requested to contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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